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Biodiesel from *Gliricidia sepium* and *Baphia nitida*: A renewable source of energy for sustainable development in rural Africa

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With the depletion of oil resources as well as the negative environmental impact associated with the use of fossil fuels; self-sufficiency in energy requirement is critical to the success of any developing economy. Biodiesel is simple to use, biodegradable, nontoxic and essentially free of sulfur and aromatics. Presently, over 70% of the population of the people in Africa lives in rural areas where there are resources for agriculture. *Gliricidia sepium* and *Baphia nitida* are two underutilized plants in Nigeria; they are planted as a shade tree. Their seeds are discarded as waste in Nigeria creating a waste disposal problem. Biodiesel was produced from the oils of these underutilized seeds using a two-step reaction system. The first step is a pretreatment which involved the use of 2% sulphuric acid in methanol and secondly, transesterification reaction using KOH as catalyst. The result of the method applied showed a conversion of ester content above 98% with phosphorus content below 1 ppm while the copper strip corrosion test was 1A in both biodiesel. The oil of *Gliricidia sepium* and *Baphia nitida* with high free fatty acid can be reduced in a one-step pretreatment of esterification using H₂SO₄ as catalyst. This one-step pretreatment reduced the problem of soap formation normally encountered when using oil with free fatty acid for the production of biodiesel, thus reducing the production cost of the *Gliricidia sepium* and *Baphia nitida* biodiesel. The biodiesel produced from the oil of *Gliricidia sepium* and *Baphia nitida* exhibited properties that are in agreement with the recommended European standard (EN 14214).

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